



Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Supported (ACSS/TW)¹

This standard is issued under the fixed designation B 857; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This specification covers shaped wire compact concentric-lay-stranded aluminum conductors, steel supported (ACSS/TW) for use as overhead electrical conductors (see Note 1 and Note 2).

NOTE 1—In this specification only shaped wire compact concentric-lay-stranded aluminum conductors, steel supported, are specifically designated. Conductor constructions not included in this specification should be agreed upon between the manufacturer and the purchaser when placing the order.

NOTE 2—For definitions of terms relating to conductors, refer to Definitions B 354.

1.2 The values stated in inch-pound units are to be regarded as the standard with the exception of temperature and resistivity. The SI equivalents given in parentheses may be approximate.

NOTE 3—ACSS/TW is designed to increase the aluminum area for a given diameter of conductor by the use of trapezoidal shaped wires (TW). The conductors consist of a central core of round steel wire(s) surrounded by two or more layers of trapezoidal aluminum 1350-0 wires. Different strandings of the same size of conductor are identified by type, which is the approximate ratio of steel area to aluminum area expressed in percent (see Table 1, Table 2, and Table 3). For the purpose of this specification, the sizes listed in Table 1 and Table 2 are tabulated on the basis of the finished conductor having an area or outside diameter equal to that of specified sizes of standard ACSR, ACSS, and ACSR/TW so as to facilitate conductor selection.

NOTE 4—The aluminum and temper designations conform to ANSI Standard H 35.1. Aluminum 1350 corresponds to Unified Number System (UNS) A91350 in accordance with Practice E 527.

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form part of this specification to the extent referenced herein:

2.2 ASTM Standards:

B 232 Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Reinforced (ACSR)²

B 263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors²

B 341 Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)²

B 354 Terminology Relating to Uninsulated Metallic Electrical Conductors²

B 498 Specification for Zinc-Coated (Galvanized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)²

B 500 Specification for Metallic Coated Stranded Steel Core for Aluminum Conductors, Steel Reinforced (ACSR)²

B 502 Specification for Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced²

B 549 Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced (ACSR/AW)²

B 606 Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced²

B 609 Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Temper, for Electrical Purposes²

B 779 Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Steel-Reinforced (ACSR/TW)²

B 802 Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel-Reinforced (ACSR)²

B 803 Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel-Reinforced²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³

E 527 Practice for Numbering Metals and Alloys (UNS)⁴

2.3 Military Standard:

MIL-C-12000 Cable: Cord and Wire, Electric Packaging of⁵

¹ This specification is under the jurisdiction of ASTM Committee B-1 on Electrical Conductors and is the direct responsibility of Subcommittee B01.07 Conductors of Light Metals.

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² *Annual Book of ASTM Standards*, Vol 02.03.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ *Annual Book of ASTM Standards*, Vol 01.01.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

TABLE 1 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported^A

NOTE 1—Sized to have area equal to ACSR or ACSS, Class AA.

ACSS/TW Conductor Size		Size and Stranding of ACSS with Equal Area		Number of Aluminum Wires	Number of Layers	Steel Core Stranding		Nominal Mass ACSS/HS/TW, lb/1000 ft	Rated Strength (by type of steel core wire)			Nominal Outside Diameter in.
kcil ^A	Type	kcil	Stranding			Number of Wires	Diameter, in.		ACSS/HS/TW/MS/TW, KIPS	ACSS/GA/TW/ACSS/MA/TW, KIPS	ACSS/AW/TW, KIPS	
477.0	13	477.0	24/7	18	2	7	0.0940	612	14.2	13.0	12.5	0.78
477.0	16	477.0	26/7	18	2	7	0.1053	655	17.1	15.6	14.9	0.79
556.5	13	556.5	24/7	18	2	7	0.1015	714	16.6	15.2	14.6	0.84
556.5	16	556.5	26/7	20	2	7	0.1138	764	19.9	18.2	17.5	0.85
636.0	13	636.0	24/7	18	2	7	0.1085	818	19.0	17.3	16.7	0.89
636.0	16	636.0	26/7	20	2	7	0.1216	873	22.4	20.7	19.9	0.91
795.0	7	795.0	45/7	17	2	7	0.0886	891	15.2	14.2	13.5	0.96
795.0	10	795.0	22/7	18	2	7	0.1108	974	20.6	18.9	18.3	0.98
795.0	13	795.0	54/7	20	2	7	0.1213	1020	23.3	21.7	20.9	0.99
795.0	16	795.0	26/7	20	2	7	0.1360	1091	28.0	25.9	24.4	1.01
954.0	5	954.0	42/7	30	3	7	0.0837	1028	15.2	14.2	13.6	1.05
954.0	7	954.0	45/7	32	3	7	0.0971	1074	18.0	16.7	16.2	1.06
954.0	13	954.0	54/7	20	2	7	0.1329	1227	28.0	26.0	24.6	1.08
1033.5	5	1033.5	42/7	30	3	7	0.0871	1114	16.4	15.4	14.8	1.09
1033.5	7	1033.5	45/7	32	3	7	0.1010	1163	19.5	18.1	17.6	1.10
1033.5	13	1033.5	54/7	21	2	7	0.1383	1326	30.3	28.2	26.1	1.13
1113.0	5	1113.0	42/7	30	3	7	0.0904	1199	17.5	16.3	15.9	1.13
1113.0	7	1113.0	45/7	33	3	7	0.1049	1253	21.0	19.5	18.9	1.14
1113.0	13	1113.0	54/19	38	3	19	0.0862	1427	33.2	30.4	28.8	1.19
1192.5	5	1192.5	42/7	30	3	7	0.0936	1285	18.7	17.5	17.0	1.17
1192.5	7	1192.5	45/7	33	3	7	0.1085	1342	22.5	20.9	20.3	1.18
1192.5	13	1192.5	54/19	38	3	19	0.0892	1529	35.5	32.6	30.8	1.22
1272.0	5	1272.0	42/7	30	3	7	0.0967	1371	20.0	18.7	18.2	1.20
1272.0	7	1272.0	45/7	35	3	7	0.1121	1432	24.0	22.3	21.6	1.22
1272.0	13	1272.0	54/19	39	3	19	0.0921	1630	37.3	34.1	32.8	1.26
1351.5	7	1351.5	45/7	35	3	7	0.1155	1521	25.5	23.7	23.0	1.26
1351.5	13	1351.5	54/19	39	3	19	0.0949	1732	39.6	36.2	34.9	1.30
1431.0	7	1431.0	45/7	36	3	7	0.1189	1611	27.0	25.1	24.3	1.29
1431.0	13	1431.0	54/19	39	3	19	0.0977	1834	41.9	38.4	36.9	1.34
1590.0	7	1590.0	45/7	36	3	7	0.1253	1790	29.6	27.9	27.0	1.36
1590.0	13	1590.0	54/19	42	3	19	0.1030	2038	46.6	42.6	41.1	1.41
1780.0	8	1780.0	84/19	37	3	19	0.0874	2061	38.2	35.3	33.6	1.45
2156.0	8	2156.0	84/19	64	4	19	0.0961	2512	45.5	42.1	40.7	1.61

^AConversion factors: standards.iteh.ai/catalog/standards/sist/57836338-5bef-432d-92de-fa6a14b5914/astm-b857-95
 1 cmil = 5.067E - 04 mm²
 1 in. = 2.54E + 01 mm
 1 lb/1000ft = 1.488E - 00 kg/km
 1 ft = 3.048E - 01 m
 1 lb = 4.536E - 01 kg
 1 lbf = 4.448E - 03 KN

2.4 Other Standards:

- ANSI H35.1 American National Standard Alloy and Temper Designation Systems for Aluminum⁶
- NBS *Handbook 100*—Copper Wire Tables of the National Bureau of Standards⁷

3. Terminology

3.1 Definitions:

- 3.1.1 *aluminized*—aluminum coated.
- 3.1.2 *aluminum-clad*—aluminum sheathed.
- 3.1.3 *galvanized*—zinc coated.

3.2 Abbreviations:

3.2.1 *ACSS/TW*—shaped wire aluminum conductor, steel supported.

3.2.2 *ACSS/TW/AZ*—supported with aluminized steel core wire in accordance with Specification B 341.

3.2.3 *ACSS/TW/AW*—supported with aluminum-clad core wire in accordance with Specification B 502.

3.2.4 *ACSS/TW/GA*—supported with galvanized steel core wire, coating Class A in accordance with Specification B 498.

3.2.5 *ACSS/TW/GB*—supported with galvanized steel core wire, coating Class B in accordance with Specification B 498.

3.2.6 *ACSS/TW/GC*—supported with galvanized steel core wire, coating Class C in accordance with Specification B 498.

3.2.7 *ACSS/TW/HS*—supported with high-strength galvanized steel core wire in accordance with Specification B 606.

3.2.8 *ACSS/TW/MA*—supported with Zn-5A1-MM coated steel core wire, coating Class A in accordance with Specification B 802.

⁶ Available from American National Standards Institute, 11 W. 42nd Street, 13th Floor, New York, NY 10036.

⁷ Available from National Technical Information Services, 5285 Port Royal Road, Springfield, VA 22161.

TABLE 2 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported^A

NOTE 1—Sized to have diameter equal to ACSR or ACSS, Class AA.

ACSS/TW Conductor Size		Size and Stranding of ACSS with Equal Diameter		Number of Aluminum Wires	Number of Layers	Steel Core Stranding		Nominal Mass ACSS/HS/TW, lb/1000 ft	Rated Strength (by type of steel core wire)			Nominal Outside Diameter in.
kcmil	Type	kcmil	Stranding			Number of Wires	Diameter, in.		ACSS/HS/TW, MS/TW, KIPS	ACSS/GA/TW, ACSS/MA/TW, KIPS	ACSS/AW/TW, KIPS	
571.7	13	477.0	24/7	18	2	7	0.1030	734	17.1	15.6	15.0	0.85
565.3	16	477.0	26/7	20	2	7	0.1146	776	20.2	18.4	17.7	0.86
666.6	13	556.5	24/7	20	2	7	0.1111	856	19.9	18.2	17.5	0.91
664.8	16	556.5	26/7	20	2	7	0.1244	913	23.4	21.7	20.9	0.93
768.2	13	636.0	24/7	20	2	7	0.1195	987	23.0	21.0	20.2	0.98
762.8	16	636.0	26/7	20	2	7	0.1331	1047	26.8	24.9	23.4	0.99
957.2	7	795.0	45/7	32	3	7	0.0973	1078	18.1	16.8	16.3	1.06
946.7	10	795.0	22/7	35	3	7	0.1154	1140	22.9	21.1	20.3	1.08
966.2	13	795.0	54/7	21	2	7	0.1338	1240	28.3	26.4	24.9	1.09
959.6	16	795.0	26/7	22	2	7	0.1493	1317	33.1	30.7	28.2	1.11
1168.1	5	954.0	42/7	30	3	7	0.0926	1259	18.3	17.2	16.7	1.16
1158.0	7	954.0	45/7	33	3	7	0.1078	1307	22.1	20.5	19.9	1.17
1158.4	13	954.0	54/7	25	2	7	0.1467	1488	33.5	31.1	28.7	1.20
1272.0	5	1033.5	42/7	30	3	7	0.0967	1371	20.0	18.7	18.2	1.20
1257.1	7	1033.5	45/7	35	3	7	0.1115	1416	23.8	22.1	21.4	1.21
1233.6	13	1033.5	54/7	38	3	19	0.0910	1584	36.3	33.2	32.0	1.25
1372.5	5	1113.0	42/7	30	3	7	0.1004	1479	21.5	20.2	19.6	1.25
1359.7	7	1113.0	45/7	36	3	7	0.1159	1531	25.7	23.9	23.1	1.26
1334.6	13	1113.0	54/19	39	3	19	0.0944	1711	39.1	35.8	34.5	1.29
1467.8	5	1192.5	42/7	33	3	7	0.1041	1583	23.1	21.6	21.0	1.29
1455.3	7	1192.5	45/7	36	3	7	0.1200	1639	27.1	25.6	24.8	1.30
1433.6	13	1192.5	54/19	39	3	19	0.0978	1838	42.0	38.4	37.0	1.34
1569.0	5	1272.0	42/7	33	3	7	0.1074	1691	24.6	23.1	22.4	1.33
1557.4	7	1272.0	45/7	36	3	7	0.1241	1754	29.0	27.3	26.5	1.35
1533.3	13	1272.0	54/19	39	3	19	0.1012	1966	45.0	41.2	39.6	1.38
1657.4	7	1351.5	45/7	36	3	7	0.1280	1866	30.9	29.1	28.2	1.39
1622.0	13	1351.5	54/19	39	3	19	0.1064	2105	49.3	45.0	43.3	1.42
1758.6	7	1431.0	45/7	37	3	7	0.1319	1980	32.8	30.9	29.4	1.43
1730.6	13	1431.0	54/19	39	3	19	0.1075	2219	50.8	46.4	44.7	1.47
1949.6	7	1590.0	45/7	42	3	7	0.1392	2197	36.5	34.3	31.7	1.50
1926.9	13	1590.0	54/19	42	3	19	0.1133	2469	56.4	51.6	49.7	1.55
2153.8	8	1780.0	84/19	64	4	19	0.0961	2510	45.5	42.1	40.7	1.60
2627.3	8	2156.0	84/19	64	4	19	0.1062	3063	55.6	51.3	49.7	1.76

^AConversion factors:

- 1 cmil = 5.067E - 04 mm²
- 1 in. = 2.54E + 01 mm
- 1 lb/1000ft = 1.488E = 00 kg/km
- 1 ft = 3.048E - 01 m
- 1 lb = 4.536E - 01 kg
- 1 lbf = 4.448E - 03 KN

TABLE 3 Comparison of ACSS/TW With Equivalent Stranding of ACSR^A and ACSS^B

ACSS/TW Type Number ^C	Conventional ACSR and ACSS Stranding ^D
5	42/7
7	45/7
8	84/19
10	22/7
13	54/7
13	24/7
16	26/7

^AThe equivalent stranding is that stranding of conventional ACSR that has the same area of aluminum and steel as a given ACSS/TW type.

^BThe equivalent stranding is that stranding of conventional ACSS that has the same area of aluminum and steel as a given ACSS/TW type.

^CACSS/TW type number is the approximate ratio of the steel area to the aluminum area in percent.

^DSee Specifications B 232, B 549, and B 856.

3.2.9 *ACSS/TW/MB*—supported with Zn-5Al-MM coated steel core wire, coating Class B in accordance with Specification B 802.

3.2.10 *ACSS/TW/MC*—supported with Zn-5Al-MM coated steel core wire, coating Class C in accordance with Specification B 802.

3.2.11 *ACSS/TW/MS*—supported with high-strength Zn-5Al-MM coated steel core wire in accordance with Specification B 803.

3.2.12 *Zn-5Al-MM*—zinc-5 % aluminum-mischmetal alloy.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

- 4.1.1 Quantity of each size,
- 4.1.2 Conductor size, kcmil area and diameter,
- 4.1.3 Conductor type and number of wires, aluminum and steel, (Table 1 and Table 2),
- 4.1.4 Type of steel core wire and class (if applicable) of coating (see 5.2),